

The effect of product and psychology of innovation on the competitiveness in the pharmaceutical industry

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Abstract

The effect of product and innovation psychology on the competitiveness of the pharmaceutical industry and its relationship with sociodemographic variables were investigated in a sample of employees of a pharmaceutical company operating in Bursa. The questionnaire for participating in innovation thought and innovation in business, adapted to the example of SME in Kayseri by Yapar (2015), was applied to a sample of 107 employees (67.3% of male) randomly selected at an average age of 26. The findings show a positive and significant relationship between the basic market structure of the enterprise and the innovation scale in the enterprise ($r = 0.209, p < 0.05$), the annual turnover of the enterprise ($r = 0.772, p < 0.05$), as well as innovation in the enterprise. It shows that the scores obtained from the scale positively predict the competitiveness scores.

Keywords: Pharmaceuticals, innovation, competition.

1. Introduction

There is an increasing interest in innovation, which is linked to the increasing competition in the world pharmaceutical industry. In today's world, where information multiplies very rapidly and information is rapidly outdated, the development of structures to produce information has become an impossible factor for the future in terms of competition in the pharmaceutical industry. In the historical process of human beings, knowledge and technology have been the driving force of innovative progress in all periods. However, the most important feature that makes the day different from the past is the increase in the speed of innovation to show itself, spread and disappear.

Some of the researchers predict that every 10 years, much of the entire information density has been produced during this period, from the discovery of the article to the time. Apart from this, the companies in this period reveal the concept of innovation as a strategic solution to gain an advantage in competition. Innovation can be defined as developing a product, service or process and making it more useful. It can also be stated that innovation is an important concept for the continuity of companies in the market. Apart from this, they do product innovation not only to gain a competitive advantage in the market but also to increase their income. As time passed, as we moved to a production structure organised in connection with the physical strengths and capabilities that provide value and production, information and knowledge in the context of

information economy, human labour has become the most important source of value by displacing physical labour. For pharmaceutical companies that are organised based on the product economy structure, the function of interacting with the environment and managing the drug production and learning processes in the pharmaceutical company manifests itself. In this structure, R&D employees, scientists, engineers and workers have become the main actors that reveal the innovation stages (Tuncel, 2012).

Innovation is the transformation of pharmaceutical science and technology into an economic or social benefit. To explain in more detail, innovation is the state of pharmaceutical science and technology translated into drugs, processes, structures and services.

Key terms involved in this transformation are a skilled workforce and infrastructure. For pharmaceutical companies, the main method of producing new drugs with a high level of competition is to have a transparent pharmaceutical company culture. As it is an undeniable detail, it is not an easy task for pharmaceutical companies to differentiate their cultural systems in a short time in order to reach a system open to innovation.

As a result, it is very difficult for an employee who works with similar technical technology for years to adapt to a new technique and technology after years and to obtain a system that demonstrates its creativity by continuing to produce innovations. In summary, for the

innovative ideas to show itself, the necessary information and information provided by the employees of the pharmaceutical company from the external environment must be found in such a flexible system that the pharmaceutical company can easily discuss so that they can practice their medicines.

Apart from that, an innovation process should not be understood only in the pharmaceutical company as the business of the major department or individual. All employees of the pharmaceutical company should participate in this process. This situation will facilitate the acceptance of the innovation process by both the active and pharmaceutical company employees (Uzkurt, 2010).

As a result of the literature research, ethnographic observation and the researcher's own experience, it has been concluded that product innovation makes a significant contribution to the competitiveness of the companies that continue their activities in the pharmaceutical industry. In this context, this study will also be able to guide the pharmaceutical company managers who want to gain competitive power in the market in how they should evaluate the product innovation.

1.1. Definition of drug

Pharmaceuticals, according to the definition of the World Health Organisation (WHO), it is a substance that can be used for the purpose of changing or examining physiological systems or pathological systems, i.e., disease-causing conditions for the benefit of the user (Cingi & Erol, 1996).

The World Health Organisation defines the drug in terms of its relationships with the biological system. Besides, medicine can be explained economically by using the commodity concept. Meta is a usage value, and also, the exchange has a value (Marx, 2011).

In this case, it can be said that the drug has a usage and exchange value similar to other goods. If we define the drug in terms of economy politics, it is a social product that is used for the purpose of replacing or examining drug physiological systems or pathological problems for the benefit of the user, which is produced for the purpose of exchange and is not necessary without it (Abacioglu, 2010).

Medicines are chemical or biological structures that emerge as a result of time-consuming, costly and risky R&D activities. Although their discovery is costly and risky, once they are found and placed on

the market (especially, chemical-based drugs), they can be easily copied by reverse engineering methods. As a result, companies bear the high costs arising from R&D activities, and when they cannot get the return of their investments, there will be serious decreases in new drug entry into the market. In order to overcome this negativity, patent protection is applied extensively in the sector (Saleh, 2010).

1.2. Pharmaceutical industry

Increasing world population and life expectancy, as well as increasing social access to treatment and medication, along with the widespread social security, make the pharmaceutical industry a continuously increasing sector.

The pharmaceutical sector, which is amongst the top three sectors in the world, is expected to continue to expand in the future, primarily in the generic (generic) drug market. It is thought that this expansion will exceed 10% in Asia, Africa, Australia and South America, compared to the other regions (Acaray, 2007).

In 2015, within the framework of the Intercontinental Marketing Statistics data, the sector reached a market volume of 1.08 trillion in USD terms, and 95% of the pharmaceutical market in the world is operating internationally. In 2015, 35% of total pharmaceutical sales in the world were realised by the USA, 7% by China and 6% by Japan, which corresponds to approximately 50% of the total sales. About 14.4% of R&D expenditures in the world are made by the pharmaceutical industry. The USA hosts many of the world's leading companies with its average drug expenditure per capita, research pharmaceutical industry presence and sector turnover and is the leading country in the sector. In the coming period, the USA is expected to continue its leadership by increasing its share with the projection of 1%–4% growth projected for the North American continent. In the pharmaceutical industry, however, the EU ranks second after the USA, followed by China (Biniciogullari, 2008).

The pharmaceutical sector is considered as one of the most critical sectors of the country when evaluated economically. In addition, expressing the amount of drugs produced with very high figures in terms of economic value reveals the sector's desire to be managed by big players. However, the price margins experienced in the past 6 years, and the fact that the profit margin was not at its former state brought along structural changes in the sector. The drug, which has a line in direct

proportion to the general condition of human health, is the preparations that are ready for the use of the end-user and directly affect the normalisation of the abnormal state in the human body. In particular, drugs in the specific group cannot be used interchangeably and are not considered substitutes. However, many products are used interchangeably, and there are competitive conditions. Besides using different products as a trade name or molecule, a non-drug product does not correspond to a molecule that acquires a drug identity. Therefore, high drug prices do not affect the necessity of the drug. This enables the pharmaceutical industry to see its importance in the world (Bilgener, 2002).

In this section, the demand and supply structure that differentiates the pharmaceutical sector from other sectors, the effects of price and non-price regulations, the effects of these regulations on the sector and the effects of these regulations on the sector will be included in the literature.

1.2.1. General structure of the pharmaceutical industry

Pharmaceutical industry: It is a branch of industry that makes synthetic, herbal, animal and biological chemical substances used as therapeutic, protective and nutritious in human and veterinary medicine into simple or compound pharmaceutical forms in certain doses in accordance with pharmaceutical technology and mass production (Izmirlioglu, 2001).

The pharmaceutical industry is a sector that progresses based on R&D and is subjected to a high level of control (Pharmaceutical industry investigation preliminary report, 2018, <http://www.ieis.org.tr>).

The main purpose of the industry: It has been determined as the presence of a pharmaceutical industry that has international competitiveness, enhances the quality of life and meets most of the country's pharmaceutical needs (Izmirlioglu, 2001).

In this section, the economic and political structure of the sector related to supply and demand will be included, and the dynamics of the sector will be made more understandable in terms of the following sections.

1.2.2. Supply and demand structure of the pharmaceutical industry

Pharmaceutical industry: It also has a different demand structure due to the presence of health insurance. The pharmaceutical sector has a strong market power supply, and patent applications are of great importance for this sector. For all these

reasons, the pharmaceutical sector differs from other sectors. Therefore, it should be mentioned that the pharma industry has its own characteristics: First, since the pharmaceutical industry manufactures medicines based on herbal substances, organic or synthetic, the production goes through a wide variety of stages. Later, since there is no consumer demand or the price of the product that determines the purchase and use of the drug, the price flexibility is almost non-existent. The reason for the low demand elasticity of the produced goods is that there is no direct decision of the consumers in the purchase of such goods. In other words, it is not possible for the drugs to be demanded by the consumers with their free will, and decisions are made by others other than the consumers. For example, the doctor is the person who makes the purchase decision on behalf of the patient (consumer). In fact, this also shows that competition between pharmaceutical companies occurs mainly in the same market. Hence, all the important pharmaceutical companies of the industry get most of their income from the sale of prescription drugs, and these drugs cannot be purchased without a prescription from a medical doctor. Third, just as production goes through various and complex stages, an organisation that will take its place in the market has to make a series of different arrangements (Karakoc, 2005).

1.2.3. Competition in the pharmaceutical industry

Competition in the pharmaceutical sector refers to a dynamic process that started in the R&D phase and reached the top levels with the end of patent protection. As mentioned in the section on the product life cycle, the active substances that are researched for use in the treatment of a particular disease may face the competition of the active substances that are in similar processes for the treatment of the same disease before they come to the market. In this sense, whilst other conditions are equal, the first active ingredients and drugs containing them are more advantageous commercially than others. Rather than mentioning a single market structure such as oligopol, monopoly, monopson or perfect competition in the pharmaceutical sector, it would be a better approach to address the different market structures in the sector and how this affects the prices and drug consumption preferences.

Competition amongst the manufacturers in the sector such as ATC-3 and ATC-4 can be classified as competition between the active substance and the generics contained in the same active substance (Saleh, 2010).

2. Materials and methods

2.1. Aim

The aim of the descriptive and cross-sectional study is to determine the effect of product and innovation psychology on the competitiveness of the pharmaceutical industry in the employees of pharmaceutical companies operating in Bursa. The data were collected in 2019.

2.2. Participants

A total of 107 employees (male: 67.3% and average age = 26) from the pharmaceutical companies operating in Bursa were informed about the research and were agreed to participate in this study. The research was approved by the Cyprus Near East University ethics committee. The sample is randomly selected and willing employees. Participants were chosen from amongst low-level managers, mid-level managers, senior managers and other employees.

2.3. Recruitment process

Permission was obtained from pharmaceutical companies operating in Bursa Province for the study. Later, employees were informed about the purpose of the work, the nature of the tests and ethical provisions, including confidentiality and anonymity. Informative consent forms were obtained from the employees who decided to participate by having them signed.

2.4. Survey

In the sociodemographic data form, which was first developed by the researcher, the gender of the research participants, the year of birth, the education status, the position in the enterprise, the professional experience period, the age of the enterprise, the annual turnover of the enterprise, the number of employees in the enterprise, the sector in which the enterprise operates, the documents owned by the enterprise, whether it does or not, the legal structure of the enterprise and the basic market structure of the enterprise have been applied. After that, participation in innovation thinking consisting of 17 items and innovation in the enterprise consisting of 28 items were applied. In this study, the Cronbach's alpha value of Participation in Innovation Thought was 0.975, and innovation in business Cronbach's alpha value was 0.950.

2.5. Data analysis

Descriptive statistics were produced with the data obtained from participation in innovation thinking and innovation in business surveys and

sociodemographic research, and the questions of participation in innovation thinking and innovation in business were compared. In order to determine the patterns more clearly, the sociodemographic variables such as gender, year of birth, education status, position in the company, professional experience period, age of the enterprise, annual turnover of the enterprise, number of employees in the enterprise, the sector in which the enterprise operates, the documents owned by the enterprise, whether it does or not, the legal structure of the business and the basic market structure of the business are grouped into levels.

The data obtained in this study were analysed using the Statistical Package for the Social Sciences (SPSS) 24.0 program.

3. Results

Employees were included in the survey according to their gender [32.7% ($n = 35$) of women and 67.3% ($n = 72$) of men], according to their age [13.1% ($n = 14$) of 17–26 years old, 40.2% ($n = 43$) between the ages of 27 and 36 years, 43.0% ($n = 46$) between the ages of 37 and 46 years and 3.7% ($n = 4$) between the ages of 47–57 years], according to their educational status [10.3% ($n = 11$) of high school, 19.6% ($n = 114$) of vocational schools, 54.2% ($n = 58$) of the university and 15.9% ($n = 17$) of graduates]. According to their position in the business, 8.4% ($n = 9$) were low-level managers, 31.8% ($n = 34$) were mid-level managers, 12.1% ($n = 13$) were senior managers and 47.7% ($n = 51$) were other employees; according to their professional experience, 7.5% ($n = 8$) were between 0 and 1 years, 15.0% ($n = 16$) were 2–4 years, 27.1% ($n = 29$) were 5–10 years, 33.6% ($n = 36$) were 11–15 years and 16.8% ($n = 18$) were 16 years and above.

According to the status of the enterprises included in the research, 6.5% ($n = 7$) were 0–1 year old, 15.9% ($n = 17$) were 2–5 years old, 31.8% ($n = 34$) were 6–10 years old, 45.8% ($n = 49$) were 11–16 and above; according to the annual turnover of the enterprise, 24.3% ($n = 36$) have 0–999.999 TL, 8.4% ($n = 9$) have 1,000.000–7,999.999 TL, 15.0% ($n = 16$) have 8,000.000–40,000.000 TL and 52.3% ($n = 56$) have over 40,000.000 TL. According to the number of employees in the enterprise, 6.5% ($n = 7$) were of 1 person, 17.8% ($n = 19$) were of 19 people, 6.5% ($n = 7$) were of 6–10 people, 4.7% ($n = 5$) were of 11–50 people and 64.5% ($n = 7$) were of 51–250 people; according to the sectors in which businesses operate, 4.7% ($n = 5$) were pharmacy, 52.3% ($n = 56$) were pharmaceutical company, 23.4% ($n = 25$) were health enterprises and 19.6%

($n = 21$) were medical equipment sales enterprises. According to the documents owned by businesses, 14.0% ($n = 15$) had ISO Certificates, 20.6% ($n = 22$) had Trademark Registration Certificate, 16.8% ($n = 18$) had CE Certificate, 13.1% ($n = 14$) had TSE Certificate and 35.5% ($n = 38$) had other documents; according to whether the enterprises' export, 45.8% ($n = 49$) do export and 54.2% ($n = 58$) does not export. According to the owners of the businesses, 18.7% ($n = 20$) were private enterprises, 28.0% ($n = 30$) had limited companies, 47.7% ($n = 51$) had joint stock companies and 5.6% ($n = 6$) had other companies; according to the number of employees in enterprises, 6.5% ($n = 7$) work 1 person, 17.8% ($n = 19$) work between 2 and 5 people, 6.5% ($n = 7$) work between 6 and 10 people, 4.7% ($n = 5$) work between 11 and 50 people and 64.5% ($n = 69$) work between 51 and 250 people. According to the basic market structures of businesses, 15.9% ($n = 17$) are local, 11.2% ($n = 12$) are regional, 37.4% ($n = 40$) are national and 35.5% ($n = 38$) are international.

Skewness and kurtosis values were found between (skewness ± 2) and kurtosis (kurtosis ± 7) (IISP: -1.187 ; $p < 0.05$). The normality distribution of the data obtained from the scale of participating in the idea of innovation has a significance value of $p < 0.000$. In the calculations, $p < 0.05$ was considered as the statistical significance level.

The normality distribution of the data obtained from the innovation scale in the enterprise was

examined with the Kolmogorov–Smirnov test, and it was seen that the data showed a normal distribution. Skewness and kurtosis values (skewness ± 2) and kurtosis (kurtosis ± 7) were found [innovation in business scale (ISB): -1.275 ; $p < 0.05$]. The normality distribution of the data obtained from the scale of participation in innovation thought has a significance value of $p < 0.000$. In the calculations, $p < 0.05$ was considered as the statistical significance level.

The distribution of the innovation scale participation scale (IISP) used in the research and ISB is given. It was determined that the scores of the scales were within the normal distribution range (skewness ± 2) and kurtosis (kurtosis ± 7) values (Curran et al. 1996).

According to these results, the variables of participation in innovation thought (IISP) and ISB did not show normal distribution, and the non-parametric techniques were used in the analysis of the data. The t -test and analysis of variance test were used whilst making comparisons between groups in line with skewness and flatness data. Internal consistency coefficients of the Participation in Innovation Ideation Scale (IISP) and the Business Innovation Scale (BIS) were calculated. As a result of the analysis, the Scale of Participation in Innovation Idea (IISP) has been determined as the Cronbach's alpha value of 0.975 and Cronbach's alpha value of the Enterprise Scale (ISB) as 0.950.

Table 1. Comparison of employees' participation in innovation thoughts according to the educational status and innovation scale scores in business

Scale	Educational status	<i>n</i>	\bar{x}	<i>s</i>	<i>F</i>	<i>p</i>
IISP	High school	11	36.84	16.38	4.304	0.007*
	Vocational school	21	31.56	20.69		
	University	58	46.95	19.43		
	Graduate	17	49.86	19.30		
ISB	High school	11	49.57	8.32	0.425	0.736
	Vocational school	21	48.57	15.00		
	University	58	50.80	10.87		
	Graduate	17	52.45	7.25		

* $p < 0.005$.

When Table 1 is analysed, it has been determined that there is a statistically significant difference between the scores of business employees included in the study from the Scale of Participation in Innovation Thought according to their educational status ($p < 0.05$). The level of graduate education level Participation in

Innovation Thought was found to be significantly higher than the graduates of the vocational school. It was determined that there was no statistically significant difference between the educational status of the business employees and the scores that they received from the Innovation Scale in Business ($p > 0.05$).

Table 2. Comparison of the participation scale of innovation scale and the innovation scale in the enterprise according to the documents owned by the enterprises

Scale	Documents the owner register	<i>n</i>	\bar{x}	<i>s</i>	<i>F</i>	<i>p</i>
IISP	ISO documents	15	46.78	20.40	1.045	0.388
	Trademark registration certificate	22	40.24	19.85		
	CE document	18	45.94	22.52		
	TSE Certificate	14	50.67	18.99		
	Other documents	38	39.89	19.76		
ISB	ISO documents	15	46.33	12.34	2.968	0.023*
	Trademark registration certificate	22	47.14	13.31		
	CE document	18	57.25	8.03		
	TSE certificate	14	49.94	12.11		
	Other documents	38	51.10	8.57		

* $p < 0.005$.

When Table 2 is examined, according to the documents owned by the enterprises, it was determined that there was no statistically significant difference between the scores that they got from the Participation in Innovation Scale ($p > 0.05$). According to the documents owned by

businesses, there was a statistically significant difference between the scores that they received from the innovation scale in the enterprise ($p < 0.05$). The innovation points of the companies that have CE Certificates were found to be significantly higher than the companies that have ISO Certificates.

Table 3. Comparison of the participation scale of innovation scale in businesses and the innovation scale in businesses by basic market structures

Scales	Basic market structures	<i>n</i>	\bar{x}	<i>s</i>	<i>F</i>	<i>p</i>
IISP	Local	17	40.10	15.01	0.948	0.420
	Regional	12	36.02	19.66		
	National	40	46.20	19.58		
	International	38	44.13	23.01		
ISB	Local	17	48.69	9.75	3.648	.015*
	Regional	12	41.75	14.09		
	National	40	51.61	10.78		
	International	38	52.90	9.65		

* $p < 0.005$.

When Table 3 is examined, according to the main market structures of the enterprises, it was determined that there was no statistically significant difference between the scores that they got from the Participation in Innovation Scale ($p > 0.05$). According to the basic market structures of businesses, there was a statistically significant difference between the scores that they received from the innovation scale in the enterprise ($p < 0.05$). The innovation points of the companies, whose basic market structure is international, were found to be significantly higher than the companies whose basic market structure is local.

When Table 4 is examined,

- It was determined that there is a statistically significant and positive relationship between Participation in Innovation Thought Scale and Innovation Scale in Business. ($r = 0.222$, $p < 0.05$). Accordingly, a positive change in innovation thinking increases innovation in the enterprise.
- A statistically significant and positive relationship was determined between the age of the enterprise and the innovation scale in the enterprise ($r = 0.242$, $p < 0.05$) and the annual turnover of the enterprise ($r = 0.486$, $p < 0.05$).

Accordingly, as the age of the business increases, innovation and annual turnover increase in the business.

- A positive and statistically significant relationship was determined between the number of employees in the enterprise and the Participation Scale for Innovation Thought ($r = 0.261$, $p < 0.05$), the age of the enterprise ($r = 0.479$, $p < 0.05$) and the annual turnover of the enterprise ($r = 0.683$, $p < 0.05$). Accordingly, as the number of employees in the enterprise increases, the number of people participating in innovation increases the age of the enterprise and the annual turnover of the enterprise.
- A statistically significant and negative relationship was determined between the sector in which the enterprise operates and the annual turnover of the enterprise ($r = -0.246$, $p < 0.05$) and the number of employees in the enterprise ($r = -0.229$, $p < 0.05$). Accordingly, as long as the enterprise changes the sector, its annual turnover and number of employees decrease.
- A statistically significant and negative relationship was determined between Export status and age of the enterprise ($r = -0.321$, $p <$

- 0.05), annual turnover of the enterprise ($r = 0.632, p < 0.05$) and number of employees in the enterprise ($r = -0.564, p < 0.05$). Accordingly, the negativity of enterprise exports causes a decrease in the lifetime of the enterprise, annual turnover and the number of employees in the enterprise. A positive and statistically significant relationship has been determined between the state of exporting and the sector in which the enterprise operates ($r = 0.241, p < 0.05$). According to this, as the points related to whether the enterprise exports or not increases, the points obtained from the sector in which the enterprise operates increases.
- In the legal structure of the enterprise and the age of the enterprise ($r = 0.320, p < 0.05$), the annual turnover of the enterprise ($r = 0.485, p < 0.05$) and the number of employees in the enterprise ($r = 0.483, p < 0.05$), a meaningful and positive relationship has been determined. Accordingly, as the scores obtained on the legal structure of the business increase, the scores obtained from the age, annual turnover and the number of employees in the business increase. A statistically significant and negative relationship has been determined between the business legal structure and export status ($r = -0.446, p < 0.05$). Accordingly, as the scores obtained about the legal structure of the business increase, the scores that they receive from the export situation decrease.
 - Between the main market structure of the enterprise and the scale of innovation in the enterprise ($r = 0.209, p < 0.05$), between the age of the enterprise ($r = 0.471, p < 0.05$) and between the annual turnover of the enterprise ($r = 0.772, p < 0.05$), a positive and statistically significant relationship was determined between the number of employees in the enterprise ($r = 0.631, p < 0.05$) and between the legal structure of the enterprise ($r = 0.431, p < 0.05$). Accordingly, as the scores obtained about the basic market structure of the enterprise increase, the points obtained in the enterprise from innovation, the age of the enterprise, the number of employees in the enterprise and the legal structure of the enterprise increase. A negative relationship was determined between the state of exporting ($r = -0.567, p < 0.05$) which has a statistical significance. Accordingly, as the scores obtained about the basic market structure of the enterprise increase, the points obtained from the export situation decrease.

Table 4. Correlation table.

	Participation Scale in Innovation Thought	Innovation Scale in Business	Property age	Annual turnover of the business	Number of employees in the business	Industry in which it operates	Documents owned	Export status	Business legal structure	Business basic market structure
Participation Scale in Innovation Thought	$r = 1$									
Innovation Scale in Business	$r = 0.222$ $p = 0.021^*$	1								
Property age	$r = 0.037$ $p = 0.705$	0.242 0.012*	1							
Annual turnover of the business	$r = 0.113$ $p = 0.247$	0.087 0.372	0.486 0.000**	1						
Number of employees in the business	$r = 0.261$ $p = 0.007^{**}$	0.186 0.055	0.479 0.000**	0.683 0.000**	1					
Industry in which it operates	$r = -0.074$ $p = 0.449$	-0.073 0.453	-0.087 0.372	-0.246 0.011*	-0.229 0.018*	1				
Documents owned	$r = -0.061$ $p = 0.532$	0.136 0.163	0.061 0.532	-0.182 0.060	-0.040 0.680	-0.190 0.051	1			
Export status	$r = -0.158$ $p = 0.105$	-0.065 0.506	-0.321 0.001**	-0.632 0.000**	-0.564 0.000**	0.241 0.012*	0.106 0.275	1		
Business legal structure	$r = -0.068$ $p = 0.485$	0.153 0.115	0.320 0.001**	0.485 0.000**	0.483 0.000**	-0.131 0.177	-0.185 0.056	-0.446 0.000**	1	
Business basic market structure	$r = 0.101$ $p = 0.302$	0.209 0.031*	0.471 0.000**	0.772 0.000**	0.631 0.000**	-0.163 0.094	-0.146 0.135	-0.567 0.000**	0.431 0.000**	1

*Correlation is significant at the 0.05 level (two-tailed).

**Correlation is significant at the 0.01 level (two-tailed).

Table 5. Innovation scale participation scale and innovation scale in business predict the competitiveness scores

	Non-std. coefficients		Std. coefficients t		p
	B	S.H.	Beta		
(Constant)	25.38	2.88		8.804	0.000*
Participation scale in innovation thought	-0.04	0.30	-0.12	.127	0.899
innovation scale in business	0.12	0.56	2.17	2.204	0.030*

* $p < 0.05$, $R^2 = 0.046$.

The results of the linear regression analysis regarding the scale of participation in the innovation thought given in Table 5 and the innovation scale scores in the enterprise predicted the competitiveness scores are given.

In Table 5, it was determined that the model was established for the purpose of examining the status of Participation in Innovation Thought and the prediction of competitiveness scores of the innovation scale scores in the enterprise and the variance in the competitiveness scores explained by 4.6%.

It was observed that the scores obtained from the innovation scale in the enterprise positively predicted the competitiveness scores. The fact that the company has received one point more than the innovation scale increases its competitive power by 0.12.

4. Discussion and conclusions

The main purpose of this research is to investigate the effect of product innovation role on competitiveness in the pharmaceutical industry.

The effect of product innovation role on competitiveness in the pharmaceutical industry has been evaluated within the framework of the opinions of the employees in the pharmaceutical industry operating in Bursa. In the innovation process, the opinions of the employees in the pharmaceutical company in terms of participating in the idea of innovation and innovation in the business are not different, whether women or men, old or young, what their positions in the pharmaceutical company are and their experiences in the pharmaceutical industry. They have similar thoughts. Although they express the same views on innovation in the enterprise according to the education level of the employees, it was observed that graduates think differently about participating in innovation.

However, their views are similar to whether the pharmaceutical companies are old and new companies, the amount of their annual turnover, the workforce, whether they are a Pharmacy, pharmaceutical company, health enterprise and medical equipment sales enterprise, whether they are exporting or not and whether they participate

in innovation thinking and innovation in business.

Kunze et al. (2013) stated that the older workers in service, manufacturing, trade and finance businesses show less resistance to change than their younger colleagues, whereas the negative relationship between age and resistance to change is much more pronounced in those with short working hours. It has been found that there is almost no relationship between age and resistance to change amongst those who have been working for a long time.

It has been reported that age may be related to the use of health information technologies. Similarly, it is seen that educational status has an effect on the use of technology and the perception of ease of the use of technology (Brown et al., 2005).

In a study conducted on entrepreneurs, it was found that women are more open to experience (Hachana et al., 2018). In a study conducted with managers and employees in the service and industry sector, it was found that innovativeness and job performance do not differ by gender (Yildiz et al., 2014).

In Nahlinder's study (2010), it was emphasised that the perspective towards innovation can be affected by gender. In another study conducted by Ş., it was determined that gender affects the perceived ease of the use of information technologies (Venkatesh, 2003).

The International Labour Organisation stated in 1980 that the 25–29 age group constituted the largest part of the working population in developed countries. However, it is stated that the majority of the working population in developed countries today consists of the 45–49 age group (Ng & Feldman, 2010).

Ng and Feldman (2008) stated that age is related to some dimensions of job performance, that older employees are more likely to engage in extra-role behaviours, less likely to engage in goals-damaging behaviours and that they contribute more to organisational activity.

Education status is directly related to the perception of innovation, and people need to work to create an environment where they can improve themselves (Yildiz, 2017).

Similar to the findings of this study, in a previous survey study on innovation, the total working time of the participants was reported as 34.4% for 1–5 years and 74.2% for under 40 years of age (Ekiyor & Arslantaş, 2014).

Competitor relations are considered to be independent of other factors other than occupational groups (Wolper, 2004).

Although the pharmaceutical companies that have CE Certificates and have an international market structure are of the same opinion, they have different views on participating in the idea of innovation.

A positive change in the idea of innovation in businesses ensures innovation in the enterprise. The innovation of the business age and the annual turnover, the increase in the number of employees in the enterprise, the number of people participating in innovation, the life expectancy and annual turnover of the enterprise, the place of the enterprise in the sector in which the enterprise operates, the age of the enterprise, the annual turnover and the number of employees in the enterprise, the increase in the number of employees in the business, innovation in the enterprise, the age of the enterprise, the number of employees in the enterprise and the legal structure of the enterprise increase the scores that they get about.

In case of changing the sector of the enterprises in which the employees are located, there are negativities in the annual turnover and the number of employees, the business export, the lifetime of the enterprise, the annual turnover and the number of employees in the enterprise, in the case of exporting as the points obtained regarding the business legal structure increase and the points obtained in relation to the basic market structure of the enterprise increase. It is observed that the scores they got from doing not do it.

The scale of participating in innovation thinking and the scale of innovation in business predict the competitiveness scores of 4.6%. It was seen that the scores obtained from the innovation scale in business predicted the competitiveness scores positively. The fact that the company gets 1 point more than the innovation scale increases its competitive power by 0.12. A statistically significant and positive relationship has been determined between the basic market structure of the business and innovation in the business.

Considering the relationship between Demir and Geyik (2014) pharmaceutical R&D investments and innovation in the literature, it is stated that there is a direct relationship between these two

phenomena. A statistically significant and positive relationship has been determined between the annual turnover of the company and the innovation in the company. In organisations, a positive relationship was found between the budget allocated for the activities of the R&D department and the organisation's ability to innovate.

It is seen that this finding supports the results of the study previously conducted by Nart, Güner and Nart (2017) on the subject in the literature. This literature finding overlaps with the research findings.

A statistically significant and positive relationship has been determined between business legal structure and innovation in business. In the literature, Yavuz (2010) found a positive relationship between the perception of organisational culture that supports innovation and innovation ability.

Abdul and Pharaon (2010), on the other hand, determined that as the perception of organisational culture that supports innovation increases, the perception of innovation ability increases and that creative ideas can be formed within the organisation. Similarities to these results of the study have been revealed in different studies in the literature.

Kelley (2010) determined that organisational culture does not only affect innovation capability but also which innovation ability to apply. Tellis, Prabhu and Chandy (2009) found a positive relationship between the perception of organisational culture and innovation ability.

Ozkan and Turunc (2015) found that organisational culture is effective on innovation ability. Okibo and Shikanda (2011) found that organisational culture affects innovation ability. Yildirim (2015) found that the ability to innovate increased with the inclusion of the organisation's employees in managerial activities to achieve organisational goals.

In the literature, Dobni (2008) stated that increasing the values of the organisational culture such as creativity, risk-taking, freedom and teamwork amongst employees will increase the innovation capability of the organisation. Accordingly, a statistically significant and positive relationship has been determined between the basic market structure of the enterprise and innovation in the enterprise. By introducing creatively designed new products, firms can reach a more competitive position than their competitors. On the contrary, rival companies may also be inclined to follow through by imitating their

competitors' product innovations (Chao, Feng & Li, 2014; Chuang, Morgan & Robson, 2015; Song, 2015).

It is natural to think that the development of a firm's absorptive capacity compared to its competitors is effective in this trend. Firms can take reactive approaches such as offering better products than their competitors (Frambach, Prabhub & Verhallen, 2003) as well as collaborating in developing new products. This literature information is consistent with the findings of the study.

In the literature on innovation, it is stated that management that allows open-mindedness, experience and cooperation is required (Kelley et al., 2011; Russell, 1999). Scott and Bruce (1994) stated that an environment that supports innovation is positively associated with innovative behaviours. In this context, it appears that managers have a great role in shaping the business environment. The individual innovative behaviours of managers involved in the strategic decisions of the business are important both in terms of their own success and in terms of affecting the behaviours of the employees under them. Similarly, it is important for managers to act decisively as much as their motivation in achieving the goal, to maintain their motivation in the face of problems that may arise, to set an example for themselves and to those working under them, to guide them and to design the working environment. It is known that business success is closely related to the performance of employees.

Hurt et al. (1977) stated innovativeness as innovator (1.5%), pioneer (13.5%), questioning (34.9%), skeptical (34.9%) and traditionalist (15.6%).

In the study in which the Turkish validity and reliability of the scale were performed, the percentages from innovative to traditionalist were found as 2.9, 13.4, 32.1, 39.7 and 12.0 (Kilicer & Odabasi, 2010), respectively. In a study conducted with academicians, it was stated that, similar to this study, academicians were generally in the questioning category.

In addition, it was stated that the innovation scores of professors were higher than the scores of assistant professors, and according to this result, it was suggested that experience made people more innovative (Demircioglu et al., 2016).

The size of the enterprises can be evaluated according to factors such as the number of employees, physical capacity (for example, the number of beds in hospitals), the amount of input or output and financial resources (Camison-

Zornoza et al., 2004).

In the literature, it is stated that large enterprises can adopt innovations more easily because they can benefit from economies of scale and reduce their costs, and they can benefit more from innovations than small enterprises. However, it is also stated that the excess of hierarchical layers in large enterprises increases the reaction times, whereas, in small enterprises, decisions can be made faster due to the faster communication, so that innovations can be accepted faster (Fama & Jensen, 1983; Nystrom et al., 2002).

It is stated that large enterprises have a more bureaucratic and rigid structure, causing them to be less innovative than small enterprises (Jaskyte, 2013; Whetten, 1987). In addition, it is stated that the management structures of small enterprises are more flexible, whereas large enterprises can access information and human capital more easily (Rogers, 2004).

There are also studies in the literature that find a negative or positive relationship or indicate that there is no relationship between innovativeness and firm size (Camison-Zornoza et al., 2004; Damanpour, 1992). In a study examining the effect of firm size according to innovation types, although the firm size was found to be effective in the adoption of radical innovations, no effect on incremental innovations was detected (Germain, 1996).

In a study conducted by Gopalakrishnan and Damanpour (2000) with commercial banks, it has been determined that there is a relationship between the adoption of innovations and firm size. Nystrom et al. (2002) found a positive relationship between hospital size and innovation as a result of their study. As a result of the data obtained from 266 scientists working in 64 projects in the fields of alternative energy, biology, chemistry, geophysics, materials sciences and interdisciplinary studies in six publicly funded research institutions, the larger organisation's technical information exchanges the time spent on research and professional activities (Mote et al., 2016).

In a study conducted with 121 companies operating in the field of biotechnology, the relationship between business size and innovation was not found to be significant, but it was found that there was a positive relationship between innovation and export intensity, and it was stated that innovation is important in accessing global markets and export success (Pla-Barber & Alegre, 2007).

Innovation does not only come from the R&D investments and inventions. Daily innovations in

the workplace is essential for the survival and well-being of the organisation (Janssen, 2000; Oldham, 1996). Therefore, human resources specialists, managers and social scientists aim to encourage a large part of the employees in the organisation to innovative behaviour (Spiegelaere et al., 2012).

Another study stated that innovative behaviour is a strategic activity that gives companies a competitive advantage and loses them. Innovative behaviour has been defined as a multi-step process by Scott and Bruce (1994). It has been reported that businesses that want to survive in a global competitive environment need to innovate and allocate sufficient resources to the R&D (Orucu et al., 2011).

On the other hand, Aktan and Toraman (2003) stated that innovation mentality is one of the most important factors that will be effective for businesses to maintain their existence and to gain competitive advantage by differentiating from their competitors.

In this study, the Cronbach's alpha value of the innovation thought inclusion scale was determined as 0.975, and the Cronbach's Alpha value of IBS was determined as 0.950. In the study conducted by Shih and Susanto (2011) in Indonesia, the Innovative Business Behaviour Scale developed by Janssen (2000, 2001) was used. The scale was scored from one to seven (1 = strongly disagree and 7 = strongly agree).

The innovative business behaviour score of 135 people working in the production and marketing unit of pharmaceutical companies in Indonesia was determined as 4.38 ± 0.95 . It is seen that the scores obtained in the study of Shih and Susanto (2011) are lower than this study.

The reliability of the questionnaire items used was first evaluated with the internal consistency Cronbach's alpha coefficient method developed by Lee Cronbach in 1951. This method tests whether the items in the scale can form a whole in order to question the homogeneous structure (Cronbach, 1970; Ekiyor & Arslantas, 2014). The reliability coefficient in the R&D and innovation studies was determined as 0.82 in the study of Kilicer and Odabasi (2010).

5. Conclusions

In response to the competition faced by each of the companies that demonstrate functionality in the global and local fields, the pharmaceutical companies have to continue their struggle very decisively. It is the primary goal of pharmaceutical companies to show success and continue their lives during the said struggle. The ability of

pharmaceutical companies to achieve these objectives will certainly be related to the advantages that they will provide for competing pharmaceutical companies. The fact that pharmaceutical companies have advantages over the pharmaceutical companies in which they are competing will make progress thanks to the ability of the pharmaceutical company to convert its assets into capabilities. In order for pharmaceutical companies to gain a competitive advantage, it will first be possible to evaluate their own assets and to answer the question of how to get better by using these assets. Innovation is the biggest guide for companies in the research stages of how to get better from the current situation. Innovation has a very important role in helping pharmaceutical companies that gain a competitive advantage over other pharmaceutical companies, in which they are competitive. Pharmaceutical companies, which make innovation intrinsic, will make their competitive advantage permanent in the competition course against other pharmaceutical companies. The fact that pharmaceutical companies identify with innovation is related to the creativity of their ability to assess their value. It is imperative that pharmaceutical companies value their values and make investments that will support the development of their abilities in order to establish innovative functions. Innovation is a dynamic group of stages, and the innovation process forces pharmaceutical companies to do all their functions in a coordinated manner with each other. In the process of innovation, it is imperative that the management of the company directs all the company functions to the same goal so that the functions of the pharmaceutical companies can operate in harmony. The point where innovation stages have the most impact is on the revenue of the pharmaceutical company. Pharmaceutical companies should either increase their market share in order to increase their revenues or go to restrictions on certain spending items. With the innovation process, the pharmaceutical companies will use their resources better to reduce their costs and increase their revenues by increasing their sales with the said competitive advantage.

In this study, the stages of innovation were explained, and it was tried to explain why it is necessary to implement these stages by pharmaceutical companies. Since pharmaceutical companies do not have the same values and capabilities, the fact that each pharmaceutical company gains Sunday advantage as a result of the innovation process can be shown to it in different ways. Major pharmaceutical companies as a result

of the innovation process whilst cost leadership in the competition gain the upper hand Sunday with some pharmaceutical drug and pharmaceutical companies have also realised the differentiation advantage differentiation strategy that is innovative in manufacturing technology can achieve a Sunday with in.

About 67.3% of the employees included in the survey were male, 43.0% were aged 37–46, 54.2% had a university degree, 47.7% had other positions other than management in the business and 33.6% had a professional experience period between 11 and 15 years. According to this conclusion, it was understood that male employees in middle age who graduated from the university were more intense in the pharmaceutical companies and that these employees were not employed as managers but experienced in their professions. This shows that pharmaceutical companies have employees who are open to product innovation and able to compete.

It was determined that there was a statistically significant difference between the scores of the participants on the Participation in Innovation Thinking Scale according to their training status ($p < 0.05$). The participation scores of graduate business employees in innovation thinking were significantly higher than those of business employees at vocational high school education level. Besides, the employees' gender, age and their position in the company, according to the length of professional experience and innovation to the idea of joining the scale of innovation in the enterprise, from innovation in the enterprise according to their educational status were found to exist between the scores on the scale, a statistically significant difference ($p > 0.05$). According to these results, it is understood that graduate workers have higher rates of participation in innovation thinking and that men and women, old and young, managers or employees and experienced or inexperienced people have similar opinions about participation in innovation thinking and innovation in the enterprise. Accordingly, it is thought that in order to increase participation rates, employees should be encouraged to increase their education levels.

Of the enterprises participating in the study, 45.8% of the enterprises are 11–16 and over, 52.3% have an annual turnover of 40,000,000 TL, 64.5% are 51–250 employees, 52.3% had pharmaceutical company, 35.5% has ISO certificates, Trademark Registration Certificate, CE Certificate and TSE Certificate, 54.2% does not export, 47.7% is a joint-stock company and 37.4% has been found to be in

the national market structure. According to this result, it was understood that the research consisted of joint-stock companies with normal annual turnovers, experienced in the sector, high number of employees, all legal documents and non-exporting national customers. In this context, it has been concluded that the enterprises in this research compete in the national market by realising product innovation.

There is a statistically significant difference between the companies in the research, their age, annual turnover, number of employees, their field of activity, whether they export or not and their legal structure, the status of participating in the idea of innovation and the innovation in the enterprise, the status of participating in innovation thinking according to the documents they have and the basic market structures. It was determined that there was no statistically significant difference ($p > 0.05$). In addition, it was determined that there is a statistically significant difference between the innovation scores of the enterprises according to the documents that they have and their basic market structures ($p < 0.05$). The innovations of enterprises with international market structure with CE certificates were found to be high.

According to these results of companies that are newly established or have been working for a long time, have low or high annual turnover, have more or less employees, have or do not have different fields of activity in the pharmaceutical sector, export or do not and have different legal structures or not, it is understood that they think similarly about participation and innovation in business. Accordingly, it is thought that enterprises should be encouraged to obtain CE certification and to switch to an international market structure in order to increase their participation rates.

Between participation in innovation thinking and innovation in the enterprise, between the age of the enterprise and innovation in the enterprise, between the age of the enterprise and the annual turnover of the enterprise, between the number of employees in the enterprise and the participation in the innovation thinking, between the number of employees in the enterprise and the age of the enterprise, between the number of employees in the enterprise and the annual turnover of the enterprise, export business status and the sector in which the business operates, between the business legal structure and the age of the business, between the business legal structure and the annual turnover of the business, between the business legal structure and the number of employees in the business, between the basic

market structure of the business and the innovation scale in the business, between the business legal structure and the age of the business, between the legal structure of the enterprise and the annual turnover of the enterprise, between the basic market structure of the enterprise and the number of employees in the enterprise and between the basic market structure of the enterprise and the legal structure of the enterprise, a statistically significant and positive relationship has been determined. Accordingly, a positive change in innovation thinking increases innovation in the enterprise. Accordingly, as the age of the enterprise increases, innovation and annual turnover in the enterprise increase. Accordingly, as the number of employees in the enterprise increases, the number of people participating in innovation thinking increases with the age of the enterprise and the annual turnover of the enterprise. According to this, as the scores on whether the enterprise exports or not, the scores obtained from the sector in which the enterprise operates increase. Accordingly, as the points obtained regarding the legal structure of the enterprise increase, the points that they receive from the age of the enterprise, annual turnover and the number of employees in the enterprise also increase. Accordingly, as the points obtained in relation to the basic market structure of the enterprise increase, the points that they get from innovation in the enterprise, the age of the enterprise, the number of employees in the enterprise and the legal structure of the enterprise also increase.

Between the sector in which the enterprise operates and the annual turnover of the enterprise, between the sector in which the enterprise operates and the number of employees in the enterprise, between the state of exporting and the age of the enterprise, between the export status and the annual turnover of the enterprise and between the export status and the number of employees in the enterprise, the legal structure of the enterprise and a statistically significant and negative relationship were determined between the state of exporting, the basic market structure of the enterprise and the state of export. Accordingly, as long as the business changes the sector, there is a decrease in its annual turnover and number of employees. Accordingly, experiencing negativities in business exports causes a decrease in the life span, annual turnover and number of employees in the enterprise. Accordingly, as the points obtained in relation to the legal structure of the enterprise increase, the

points that they get from exporting are also decreasing. Accordingly, as the scores obtained in relation to the basic market structure of the enterprise increase, the points that they receive from exporting status also decrease.

As a result of the innovation process, productivity increases are realised in pharmaceutical companies, new processes and technologies are introduced, production costs of drugs are reduced, a cost advantage against competitors is achieved and competitive advantage is achieved. Both the superiority achieved by pharmaceutical companies in pharmaceutical production costs and the changes that they have created in the pharmaceutical and drug production processes have provided an important competitive power.

5.1. Proposal

It is known that innovation in business has a positive effect on competitiveness. In this context,

- It is recommended to provide support from business managers for the acceptance and implementation of innovative thinking in businesses. As it is known, achieving success in the stages of realisation of innovation and thus securing the future are largely provided by the support of managers. In addition, employees' acceptance of innovation will provide a competitive advantage to businesses. It would be beneficial for businesses to have a management philosophy that aims to accept and apply the idea of innovation to the economic crisis, which is seen today on a global scale and has many aspects.
- It is suggested to include more innovation in businesses. Acceptance of innovation idea in enterprises, giving more place, realisation and determination of innovation policies are related to the decisions to be made by the management level. Similarly, the business structure should be organised in a way to show the innovative aspects of the employees, and the necessary structures, procedures and research parts should be carried out by the senior management.
- According to the result of this study, it is recommended to plan in-service training of business managers and employees on innovation and to include the subject of competition in the training content in order to develop the business in terms of competitiveness. In the acceptance and implementation of the innovation idea of the manpower, which constitutes the intellectual

capital of the enterprises, the decisions to provide training to the employees to be given by the management, the implementation of these training decisions and the measurement and reporting of the training implementation results are important in terms of competitiveness.

- It is recommended to carry out the studies using different research methods in a different sample in different sectors on innovation thinking and realisation in enterprises and competitiveness. The competitive conditions of today's global business life and differentiating economic conditions necessitate large-scale innovation research for businesses to achieve their continuity and income targets. Within the framework of the research results, business managers are required to demonstrate an innovative management approach in order to increase their competitiveness through innovation. However, although the perception of additional cost, which is one of the negative perceptions towards innovation in research, is an important factor in innovation, the positive perceptions towards innovation should not be prevented. If the perception of additional cost in research prevents positive perceptions, it will cause negative situations on the innovation management process and its results, as well as reduce the real impact of innovation types on competitiveness. It should be noted that academic research activities on innovation will differentiate businesses from other competitors. Although academic innovation studies conducted in the direction of demands and expectations have some additional costs at various stages in the process, their long-term contributions will be more valuable.

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